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AUTHOR Ready, Keith
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ABSTRACT

This review of the use of the teletypewriter (TTY) by state agencies and institutions in Virginia focuses on two major systems which employ TTY's not interfaced with computers, i.e., the Teletypewriter Exchange Service (TWX) and Teletypewriter for Deaf People (TD). Expenditures and policies are discussed briefly, and a need for improvement is indicated. Problem areas concerning TTY transmission where a central state planning, management, and coordination agency could play a significant role are identified as determination of user needs, TD systems improvement, telephone utilization (to take advantage of special billing rates), and research and development. (RAC)

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TELECOMMUNICATIONS STUDY COMMISSION

THE USE OF TELETYPEWRITERS IN VIRGINIA

SEPTEMBER 6, 1979

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The Use of Teletypewriters - An Overview

Teletypewriter (TTY) is a generic term used to refer to a series of different types of teleprinting equipment such as transmitters, tape punches, and page printers.[1] TTY's are basically electric typewriters by which a sender types out a message which is converted by modem and sent over telephone lines to a receiver where the signal is reconverted and typed.[2] TTY's provide a quick method of sending a "hard copy" message.

Use of TTY's, although increasing numerically, have been curtailed by more efficient forms of communications such as telephone, intelligent terminals, facsimile and teletypewriters hooked to computers (e.g., electronic mail and mailgrams).

There are two primary applications for TTY's. These include:

1. Information Access and Exchange

As previously stated, much of the utility of TTY's has been replaced by more efficient and less expensive communication methods. However, there are still applications where TTY's are just as fast as telephone, faster than U.S. Mail and facsimile, and less expensive than facsimile. Moreover, they are particularly useful for hard copy messages, statistical information, and time-critical hard copy information.

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[1]This paper only addresses teletypewriters not interfaced with computer. Teletypewriters interfaced with computer are discussed in the teleprocessing paper.

[2]Use of teletypewriter transmission requires a modem for converting digital teletypewriter signals to analog telephone signals (modulation) and then converts these signals back to digital signals at the receiving teletypewriter (demodulation).

One type of TTY network application involves a large volume of information transmitted from a few locations to multiple receiving locations which transmit little information (e.g., United Press International (UPI), Associated Press International (API), and the Weather Bureau). A second network application is called Teletypewriter Exchange Service (TWX). This is an automatic teleprinter exchange switching service procided by Bell System and Western Union which permits the transmission of typed communication between TWX subscribers at 60 to 100 words per minute. Rates are based on distance and speed.

2. Teletypewriters for Deaf People

Teletypewriters for Deaf People (TD) are a network of teletypewriters, nationwide, which provide a system on which deaf people can communicate over regular telephone systems by typing messages. The calling party dials a number and watches a monitor light for proper response (TD's generally have a visual signal to warn of the ring). The receiving party places the phone in a modem (acoustic coupler) and types an identification.

Local calls are no problem. Long-distance calls are more difficult and expensive. Most long-distance calls are direct distance dialed (or dialed w/a pre-recorded message for operator interface). The cost of long-distance telephoning is extremely expensive because of the time needed for transmission.

TD equipment is generally surplus TTY donated by services agencies (e.g., Bell System, Western Union) as well as military and government agencies. These organizations also donate personnel time for equipment reconditioning and installation.

Use of Teletypewriters in Virginia

The Office of Governmental Telecommunications Services (OGTS), has responsibility for planning, managing and coordinating TTY and TD equipment and services for state agencies and institutions.

In Virginia only a few state agencies and institutions use TTY's for general information access (e.g., Office of Energy and Emergency Services and universities) to sources such as the Weather Bureau and UPI but this application is extremely small.

It should also be noted that a great amount of TTY type equipment is used by state agencies, such as in the State Police National Law Enforcement Teletypewriter System, but these TTY's are interfaced with computers.

Thus, the Commonwealth's use of teletypewriters is limited to TWX and TD applications. The TWX network links 18 college and university libraries and is used primarily from inter-library loan and message communications.

TWX equipment is leased from Western Union by individual libraries at a base monthly rate. Individual libraries, in addition, are billed for telephone transmission costs at SCATS voice rates.

TD's use and promotion, obviously, is heaviest for those agencies concerned with providing rehabilitative services (e.g., Virginia Council for the Deaf and the Department of Vocational Rehabilitative Services). Some other service organizations, with whom the deaf have a particular need to communicate, have also purchased TD equipment (e.g., Secretary of Human Resources Office and the Office on Aging). TD equipment costs about the same as regular TTY equipment

which ranges from $50.00 (Western Union surplus) to $800 (IBM all electric portables). Rehabilitative service agencies perform a multitude of functions regarding TD equipment including new acquisition (through Department of Purchases and Supply), entering into research and development arrangements with the telephone companies, and the acquisition installation and maintenance of surplus equipment which is difficult to obtain.

State Teletypewriter Expenditures and Policies

The state spends approximately $3,000 a year on teletypewriter hardware not including TWX service or telephone transmission costs. This low figure is reflective of limited state TTY application, the fact that TD equipment is usually surplus, and the fact that much of the teletypewriting equipment needed is already in place (e.g., State Police - remembering they use TTY equipment although hooked to computer).

TWX service costs the state $39,768.28 in fiscal years 1978-1979. This fugure includes all costs. It should be noted that all cost figures are estimations and that because OGTS does not figure collective TTY costs or the value of hardware in place, true cost and value figures are not available.

Need for Improvement

The Office of Governmental Telecommunications has complete authority for state planning, management and coordination of TTY and TD equipment and services. However, OGTS does not have the staff assigned or the necessary expertise to carry out these mandates. The resulting planning, management and coordination void is partially

filled through DPS (as previously described), vendors (both for service and hardware) and with user agency personnel, who may or may not have expertise. Individual agencies rely on vendor support and/or inter or intra agency personnel on an ad hoc basis. Research into the results of these activities suggests a haphazard piecemeal approach that allows little systematic planning, management or coordination and probably results in unnecessary expenditures, increased costs, and inefficient service.

This research has identified several problem areas concerning teletypewriter transmission where a central state planning, management and coordination agency could play a significant role:

1. Determination of User Needs

   a. Multiple types of equipment are available at considerable cost differences. If agencies rely on vendors or agency personnel without expertise, there is no basis on which to be sure you have the most cost efficient system.

   b. Teletypewriters are old established communication systems; as such, they are not "status" items. Thus, the possibilities are increased that user may not consider their use or switch to "more sophisticated" equipment even if TTY's are as efficient and less costly.

   c. There is not presently, or has there been in the past, a "contact person" at OGTS with expertise in TTY's and/or TD equipment to assist DPS and user agencies. The determination of whether to purchase teletypewriters and what types of equipment and/or service to purchase can only be made after an assessment of agency needs. For example, the use of TWX service by libraries has been curtailed, and some believed will be replaced, by regionally based computer networks for cataloging and inter-library loan (e.g., Southeastern Organization of Library Information Network - SOLINET) is a private system for which users pay a standard subscription fee. Most major state university and college libraries subscribe to SOLINET. This has replaced, for many, the need for TWX, yet the equipment and service remains in place. Table 1 shows a three-year summary of the state's average TWX costs for fiscal years 1976-1979.

TABLE I

Three-Year Summary of Average TWX Service Costs in State of Virginia Libraries

Institution	May 1976 - June 1977(1) Yearly Average Price Per Call		July 1977 - June 1978 Yearly Average Price Per Call		July 1978 - June 1979 Yearly Average Price Per Call	
	Monthly	Yearly	Monthly	Yearly	Monthly	Yearly
Clinch Valley	$4.61	$3.55	$7.23	$3.87	$9.26	$6.09
Eastern Virginia Medical School(2)					.....	5.42
George Mason University	1.73	1.48	1.71	1.30	1.61	1.37
James Madison University	1.43	1.81	1.36	1.27	1.72	1.59
Mary Washington College	11.59	6.16	18.67	11.11	26.57	12.88
Old Dominion University	1.40	1.34	1.57	1.78	1.78	1.72
Univ. of Virginia - Alderman	1.13	1.09	1.24	1.21	1.36	1.29
Univ. of Virginia - Health Science	1.34	1.27	1.10	1.18	1.68	1.65
Univ. of Virginia - Science Tech.	2.51	2.14	3.08	2.81	2.96	2.44
VCU - Academic	1.22	1.39	.97	1.36	1.52	1.47
VCU - MCV	1.20	1.35	1.34	1.54	1.68	1.62
Va. Institute of Marine Science	5.19	5.40	3.00	3.17	3.18	2.96
Va. Institute of Scientific Research	10.08	11.83	14.39	10.46	13.49	8.23
Va. Military Institute	3.99	3.63	4.95	4.49	5.66	5.84
Va. Polytechnic Institute and SU	2.49	2.45	2.42	2.17	2.87	1.99
Va. State University	12.34	4.44	6.18	3.32	13.73	3.69
Va. State Library	2.75	2.91	1.90	2.18	2.35	2.20
William and Mary	2.02	2.15	2.56	2.39	3.45	3.31

(1) Based on 14 months.

(2) Service began May 1978. Figures incomplete.

Source: VA State Library/Library Development Branch

Generally, TWX service has increased in costs per call over this period. More importantly, there are tremendous disparities in the average costs per calls between institutions. For example, the average TWX call costs Mary Washington College $26.57 in FY 1978-1979, while for the same service VCU-MCV Library paid $1.68. This difference is attributed to the fact that MCV Library uses TWX service extensively and Mary Washington College seldom uses the service. This is true because all users must pay a basic monthly rate regardless of number of transmissions. Thus, the more transmissions per month, the lower the cost per call per month. There is a need for a complete review of TWX services in light of new and expanding computer based telecommunication systems.

It is also interesting to note that MCV Library has recently discontinued facsimile transmission because of small demand and high costs. TTY's and facsimile have many similar functions. It may well be that TWX service at MCV Library has negated the value of facsimile. This type of information should be analyzed prior to the purchase or rental of expensive facsimile equipment.

2. TD Systems Improvements

Presently, the role of planning, managing and coordinating systems has been assumed by rehabilitative service organizations, particularly the Virginia Council for the Deaf. These agencies have limited budget, staff, and time to carry out these de facto functions. Moreover, it is extremely difficult for these service organizations to coordinate and promote other agencies' uses of TD equipment (i.e., a de facto role is less effective than a de jure role - OGTS). These facts are particularly critical in light of the expanding system needs, some of which include:

a. coordinating the distribution of teletypewriters in Virginia with major utilities (e.g., C&P and Western Union)

b. establishing standards for equipment - compatibility

c. coordinating and planning for the procurement of surplus materials (e.g., TWX equipment)

d. working with federal and state agencies and institutions to resolve problems regarding the ability of deaf people to communicate over telephone.

e. promoting and planning for expanding TD systems

f. researching possible alternatives to high cost long distance telephone calls over TD systems

3. Telephone Utilization

Better utilization of SCATS billing rates could be obtained from TTY transmissions. SCATS arrangements are in effect 24 hours per day, however, most state use occurs between 8 a.m. and 5 p.m. on weekdays. TTY transmissions could be scheduled for off hours and weekends to effectuate better utilization of SCATS both from increased use and by relieving congestion during peak voice times.

4. Research and Development

The need to keep abreast of changing technologies is particularly important for teletypewriters because of merging and expanding technologies. Less expensive and much more sophisticated equipment may soon replace conventional teletypewriters (e.g., mailgrams and electronic mail). State agencies and institutions must be postured to accept these changes.

Concerning TD equipment, a number of changes are occurring; for example, equipment which transmits prepunched messages on paper tape, which may include an entire call. Also, present TD equipment

provides a maximum of 60 words per minute - increasing telephone costs - while new CRT screens provide the same service for less cost per call and have greater flexibility.

Research and development should include the identification of new and innovative TTY applications. For example, the possibility exists for transmitting TTY on the State Police Microwave and/or with "ancillary" television and radio signals which may result in expanded use or less costly communications. Another possibility is the development of telelectures which is a TTY system of audio and written materials together in a single voice grade telephone circuit. This system has particular possibilities for continuing, off-campus, education. The state of Wisconsin has a telelecture system. The state of Virginia also needs research and development geared to resolving existing problems (e.g., small libraries can't afford SOLINET and must remain on TWX although it may not be cost effective) and demonstrating new applications. In addition, staff should investigate and disseminate (to state and local agencies) federal and state grant information (e.g., LEAA, HEW, HUD and Social Security) grants are available which can be used for new development and systems improvements. For example, Title III funds of the Library Services and Construction Act have been used in the past for TWX hardware procurement. Assistance in grantsmanship is particularly important for TD equipment since rehabilitative service organizations have limited staff for this purpose.

CONCLUSIONS

1. The existing teletypewriting systems in Virginia are individual and autonomous in nature. There is no general coordination on a statewide all technologies level;

2. There are rapidly increasing needs for new and additional services where new technology can play a significant role;

3. Maximum efficiencies and economies in the use of existing teletypewriting equipment and services are not being realized;

4. Effective long-range planning is virtually absent;

5. There is no active central statewide planning and management of TTY systems performing such functions as determinations concerning costs, user needs, and effective telephone utilization;

6. There is no active statewide central research and development work performing such functions as improving existing applications, investigating the feasibility of new systems, and the promotion and demonstration of new technologies.

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Keith Ready

Richard Hall-Sizemore